

In re Appln. of Wolfgang Rasp et al.
Serial No. 09/913,118
Reply To Office Action Of September 30, 2004

REMARKS

This Response is responsive to the Office Action mailed September 30, 2004 wherein the Examiner rejected claim 1-10 and 14-25 under 35 U.S.C. § 103(a) as being unpatentable over European Patent Application No. 669365 (the "cited reference"). In the Office Action, the Examiner stated that the only difference seen between the instantly claimed invention and that as shown in the European patent application is the silicate species being a dried ground silicate as requisite in claim 1. The Examiner in the Office Action admits that the cited reference utilizes ethyl alcohol in the grinding of such silicate in the examples, but maintains that the patent is not limited to the silicate as exemplified. As support for this, the Examiner states that the generic reference as to the silicates certainly includes the dried ground species of silicate and one of ordinary skill in the art would be reasonable in expecting the dried ground silicate to function in an acceptable manner when added to the polypropylene resin compositions as shown in the prior art. The Examiner further states that the Applicants have failed to show or allege any unexpected results due to the utilization of the dried ground silicate when compared to the utilization of a silicate which has been formulated in the presence of an ethyl alcohol and as such the claims are rendered prima facie obvious.

Applicants in view of the remarks below and the cited case law respectfully traverse the Examiner's assertion that the present invention is prima facie obvious and respectfully submit that the pending claims are in a condition for allowance.

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I. Summary of the Invention

The present invention is directed to a laser-markable, transparent, oriented polypropylene film and method of forming thereof. As defined in Claim 1, the film includes at least one layer including a layered dry-ground silicate **having an irregular surface structure and without a coating of metal oxides**. The layered silicate is between 0.01% to 4% by weight, based on the total weight of the film. The film is at least 85% by weight polypropylene and wherein the film is laser markable.

The film generally includes at least 85% by weight, preferably from 90 to less than 100% by weight and more preferably from 98% to less than 100% by weight of a polyolefin, such as the claimed polypropylene. The polypropylene is highly isotactic, with isotacticity index of the n-heptane insoluble content of the polypropylene of at least 95%, preferably from 96% to 99%.

It is essential to the invention that at least one layer of the film includes a pigment based layered silicate or layered silicates **which has an irregular surface structure and no coating of metal oxides**. This pigmented layer generally includes pigments in an amount of 0.01% to 4% by weight, preferably from 0.5% to 2.5% by weight, and in particular from 0.8% to 1.5% by weight, based on the total weight of the film. It is therefore preferred for the pigment concentration per area unit of the film to be in the range from 0.1 to 1.0g/m², preferably from 0.1 to .7 g/m², in particular from 0.10 to 0.30 g/m². This area concentration is sufficient to ensure that the laser beam cannot pass through the film unhindered, but instead hits a pigment particle in the pigmented layer. The range for the area concentration applies irrespective of the film thickness, the layer thickness and the number of layers.

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The layered silicate-based pigments are prepared from layered silicates having a platelet-shaped structure, such as micas, which are known in the art for the preparation of pearlescent pigments. The surface structure of the pigments is modified through a dry grinding process, so that the originally smooth surface structure of the layered silicates is substantially destroyed, i.e. that the dry-ground pigments have a rough surface structure. However, the platelet-shaped character of the pigment structure is retained to a certain extend in the process. Unlike the prior art, the pigments are not provided with a coating of metal oxides or metal oxide hydrates to obtain high hiding power and high color intensity. Unexpectedly it has been found that the pigments that are not coated with metal oxides or metal oxide hydrates are advantageous since the laser marking is in the form of a white mark on a transparent film and is more readily visible due to the film being more transparent and less hazy through the use of an uncoated pigment. In addition, the transparency of the oriented film comprising uncoated pigments is surprisingly retained with virtually no change. In comparison, layered silicates (such as the titanium dioxide used in the cited reference) cause the film to become very hazy. Therefore, it has unexpectedly been found that the grinding for the production of rough surfaces, but with no coating of metal oxides, is essential in order to achieve a transparent, laser-markable, oriented film. Applicants believe that the rough and uneven surface of the pigments, produced by the dry grinding process, improves the adhesion of the polymers to the surface of the pigments in such a way that detachment and vacuole formation do not occur during the stretching process.

As defined in Claim 24, the present invention is directed to a method of marking a polypropylene film through forming an oriented polypropylene film comprising at least one layer

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having dry-ground silicate without a coating of metal oxides, which has an irregular surface, wherein the amount of the layered silicate is between 0.01 to 4% by weight, based on the total weight of the film. The film is marked by a laser selected from the group consisting of a CO₂ laser, an Nd:YAG laser and an excimer laser.

As defined in Claim 25, the present invention is directed to a method for forming and applying a marketed polypropylene film to a package, the method comprising the steps of forming an oriented polypropylene film, marking the oriented polypropylene film with a laser selected from the group consisting of a CO₂ laser, an Nd:YAG laser and an excimer laser, and applying the formed oriented polypropylene film to the package. The film comprising at least one layer having dry-ground silicate without a coating of metal oxides, which has an irregular surface, wherein the amount of the layered silicate is between 0.01 to 4% by weight, based on the total weight of the film.

II. European Patent Application No. 669365

The Examiner rejected the pending claims under 35 U.S.C. Section 103(a) as being unpatentable over European Patent Application No. 669365 (the "cited reference"). More specifically the Examiner has rejected the claims as being prima facie obvious in view of the cited reference. In view of the following remarks, Applicants respectfully traverse this rejection as conceivably applied to the pending claims.

The cited reference is directed to a polyolefin resin-based marking composition capable of developing a vivid color in dark brown to black on irradiation with laser beams, moldings of the composition and a laser marking method (Abstract & Field of Invention). In laser marking,

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laser beams are applied directly to the surface of an objective article made of a high-molecular organic material, metal or other substance to cause change of the state of the article surface or discoloration of a colorant. (Pg. 2, Lns. 17-20). This marking method has problems in practical applications in making a desired mark having vivid color development, even when a colorant is used (Pg. 2, Lns. 20-24).

In order to solve these problems when a laser marking method is applied on **polyolefin resin molded articles**, many heavy metal compounds are used, but their scope is limited since these compounds have iridescent luster although not tinted, they may develop a foreign color tone when applied to an article for which no pearly luster is needed (Pg. 2, Lns. 25-36). More specifically, the cited reference refers to another reference that proposes use of pearlescent pigments as non-tinted compounds, but the cited reference states that since these compounds have iridescent luster although not tinted, they may develop a foreign color tone when applied to an article for which no pearly luster is needed (Pg. 2, Lns. 33-36). Even as a color former, there is no completely colorless one (Pg. 2, Ln. 37). Therefore, there are such problems that if the amount of color former increases, the products to be marked are influenced in hue and color tone, the viscosity of the resin composition increases and the resin composition is influenced in its moldability, the abrasion property increases and the molding machine and kneader are injured by the abrasion at the molding. (Pg. 2, Lns. 37-41). Accordingly, even if the color former itself is colorless and its amount to be used is a very little, a marking composition to be colored in clear dark brown to black by laser beam is required (Pg. 2, Lns. 41-42).

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In the cited reference, the claimed silicon compound used acts as a color former, especially a color former developing dark brown to black in laser marking (Pg. 3, Lns. 44-45). The composition develops a dark brown color, but when titanium dioxide is added, the reddish tinge of the dark brown color is eliminated to present a gray to black color, enhancing the vividness of the formed mark (Pg. 4, Lns. 25-27). Any of the commercial products of titanium dioxide can be used, but when no transparency of the mark is required and development of a black color is desired, it is recommended to use the type of titanium dioxide which is commercially sold as a pigment material, and when it is desired to form a grayish color while maintaining the transparency of the mark, it is recommended to use particulate titanium dioxide (Pg. 4, Lns. 27-31). When a laser beam is applied to the surface of a two-dimensional or three-dimensional molding, such as mentioned above, a dark brown to black mark with a vivid contrast is formed at the irradiated portion (Pg. 5, Lns. 51-52).

In the prelude to the Examples, the cited reference states that \odot indicates that a dark brown or black mark with excellent vividness was obtained, O indicates that a dark brown or black mark with good vividness was obtained, and X indicates that the vividness of the mark was bad or there was merely obtained a white mark (Pg. 6, Lns. 15-17). The cited reference also describes the preparation of the Referential Example, which is the colorant used in the Examples. 100 ml of glass beads (1 mm ϕ), 100 g of mica (Kuralite mica 600W produced by Kuraray Co., Ltd.; average particle size: 8 μ) and 186 g of ethyl alcohol were supplied and treated in a 500 ml ceramic sand mill for 8 hours. Then the glass beads were filtered out, ethyl

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alcohol was removed by evaporation under reduced pressure and the resultant product was dried to obtain 99 g of particulate mica having an average particle size of 2 μ . (Pg. 6, Lns 21-25).

In summary, the cited reference is directed to a resin that includes a wet ground silicon compound and titanium dioxide that forms a vivid dark brown or black mark when exposed to a laser beam. The Examiner admits that the cited reference utilizes ethyl alcohol in the grinding of such silicate and does not refer to any other method of grinding.

Applicants respectfully submit that the Examiner in the current Office Action has only addressed the use of dried ground silicate versus silicate which has been formulated in the presence of an ethyl alcohol and does not address the other limitations of Claims 1, 24 and 25. Claims 1, 24 and 25 require the layered dry-ground silicate to be without a coating of metal oxides. Claims 1, 24 and 25 further require the dry-ground silicate to have an irregular surface structure. Furthermore, the Examiner has not addressed the additional limitations in dependent claims, including but not limited to the layered silicate being platelet-shaped, the dry grinding processing being carried out to produce a rough surface structure, the ground layered silicate being non-glossy, the concentration of layered silicate present in the film, the thickness of the film, and the stretching ratio.

It is well settled that under 35 U.S.C. § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Graham v. John Deere Co., Calmar v. Cook Chem. Co., 383 U.S. 1, 17 148 USPQ 459 (1966). It is also well settled that in applying 35 U.S.C. § 103 that hindsight may not be used. Dennison Mfg. Co. v. Panduit Corp.,

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475 U.S. 809, 229 USPQ 478 (1986). When the issue is nonobviousness under Section 103, the sources are examined to determine what they teach to a person with ordinary skill in the pertinent art as to the obviousness of the invention, and each prior art reference must be evaluated as an entirety. In re Sernaker, 702 F.2d 989, 217 USPQ 1 (Fed. Cir. 1983). Obviousness must be established by consideration of the prior art, as well as the claimed invention, as a whole. Polaroid Corp v. Eastman Kodak Co., 641 F. Supp. 828, 853, 228 USPQ 305, 324 (D. Mass. 1985). The reference must do more than suggest that an innovation ought to be tried or is obvious in hindsight. Id.

Applicants respectfully submit that in the present invention, the Examiner did not examine the cited reference as a whole against the currently pending claims. As discussed above, Claims 1, 24 and 25 require the layered dry-ground silicate to be without a coating of metal oxides. The cited reference actually discusses using titanium dioxide which is a metal oxide. Applicants also submit that the cited reference does not disclose, teach or suggest the dry grinding of the silicate, and only teaches the use of wet grinding. Furthermore, the cited reference does not disclose, teach, or suggest an irregular surface structure of the silicate. Applicants respectfully submit that the Examiner is improperly using hindsight and the present invention as a road map.

It is also well established that a claimed compound may be encompassed by a disclosed generic formula does not by itself render that compound obvious. In re Baird, 16 F.3d 380, 382, 29 USPQ2d 1550, 1552 (Fed. Cir. 1994). While Applicants strongly disagree with the Examiner's assertion that the dry-ground silicate is encompassed within the silicon compound of

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the cited reference, even if it was, this would not create a prima facie obviousness. The cited reference uses seven broad generic categories and then lists four individual generic series of mica. The cited reference provides a laundry list of silicon compounds, none of which include dry-ground silicate specifically. In the present invention, Applicants have included dry-ground silicates as a key part of the invention, because it is believed that the dry-grinding process improves the adhesion of the polymers to the surface of the pigments during the stretching process, which is very important in transparent films, which the present invention is directed to, but not important in molded articles, which the cited reference is directed to.

It is also well established that what otherwise might be viewed as an obvious modification of the prior art will not be deemed obvious in patent law sense when one the prior art references teach away from the invention. In re Wright, 866 F.2d 422, 9 USPQ2d 1649 (Fed. Cir. 1989). A reference may be said to teach away when a person of ordinary skill, upon reading the reference would be led in a direction divergent from the path that was taken by the applicant. Tec Air, Inc. v. Denso Mfg. Mich, Inc., 192 F.3d 1353, 1360, 52 USPQ2d 1294, 1298 (Fed. Cir. 1999). Furthermore, a reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant or if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant. In re Gurley, 27 F.3d 551, 553, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994); See also United States v. Adams, 383 U.S. 39, 52, 148 USPQ 479, 484 (1966). An Applicant can rebut prima facie obviousness of a claimed invention

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created by a prior art reference by establishing (1) the existence of unexpected properties, or (2) that the art in any material respect taught away from the claimed invention. In re Malagari, 399 F.2d 1297, 1303, 182 USPQ at 549, 533 (CCPA 1974). To establish a prima facie case of obviousness, it is necessary for the Examiner to present evidence, preferably in the form of some teaching, suggestion, incentive or inference in the applied prior art, or in the form of generally available knowledge, that one having ordinary skill in art *would have been led* to arrive at the claimed invention. Ex parte Levengood, 28 USPQ2d 1300, 1301 (Bd. Pat. App. & Int'f 1993).

Applicants respectfully submit that the cited reference teaches away from Applicants' invention. The cited reference is clearly directed to formulating a vivid color in dark brown to black on irradiation with laser beam, moldings of the composition and a laser marking method. Furthermore, even when a white mark was formed in the examples, it was deemed "merely obtained a white mark" and was marked with an X, the same mark used when no mark was formed. In fact, on Pg. 2, Lns. 41-42 of the cited reference, it states that a marking composition to be colored in clear dark brown to black by laser beam is **required**. In the present invention, the invention is directed to obtaining a white mark that is clearly visible on transparent film. The cited reference not only teaches away from forming a white mark, but states that a clear dark brown to black mark is required. Therefore, one skilled in the art would not use the cited reference. Furthermore, even if one skilled in the art used the cited reference, it teaches using a metal oxide, for color vividness, which has been clearly removed from the present invention. As stated in the summary of the present invention above, the use of metal oxide coatings reduce the transparency of the transparent film. Therefore, the cited reference clearly teaches away from

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the present invention, which requires no metal oxides coating the dry-ground silicates. Furthermore, in the background of the invention of the cited reference, it teaches the desirability to limit the abrasive properties of the resin because the molding machine and kneader are injured by the abrasion at the molding. Applicants' invention includes a dry grinding process to create an irregular surface structure, which is generally a more abrasive surface. Therefore, the cited reference also teaches away from dry ground silicate and in particular from silicates having an irregular surface structure. Furthermore, the present invention is directed to transparent films, while the cited reference is primarily directed to molded articles two very different fields and Applicants respectfully submit that one skilled in the art of transparent films would not be motivated to look at references related to molded articles. Therefore, in view of these remarks and the cited case law, Applicants have rebutted the prima facie obviousness asserted by the Examiner.

The dependent claims provide additional limitations and therefore are additionally allowable over the independent claims.

In view of the above remarks and the revised claims, Applicants submit that each of the pending claims define an invention that is patentable over the prior art.

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Prompt and favorable consideration of this amendment is respectfully requested.

Respectfully submitted,

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